

# Causal Effect of Caffeine on Heart Rate

using latin square design

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## Abstract

After drinking coffee, one's heartbeat raises. This kind of change in metabolism might be responsible for caffeine. To confirm this, we conduct an experiment. Blocked by coffe-to-water ratio and drinking speed, we build  $4 \times 4$  latin square design with caffeine intensity factor. For each cell, we measure heart rate using ECG app installed in Apple Watch (it gives average BPM).

## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Design of the Experiment</b>	<b>2</b>
<b>3</b>	<b>Data Analysis</b>	<b>2</b>
<b>4</b>	<b>Conclusion</b>	<b>2</b>
	<b>References</b>	<b>3</b>
<b>A</b>	<b>Appendix</b>	<b>4</b>
A.1	Codes . . . . .	4
A.2	ECG Results . . . . .	5

- 1 Introduction
- 2 Design of the Experiment
- 3 Data Analysis
- 4 Conclusion

## References

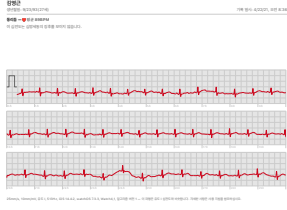
# A Appendix

## A.1 Codes

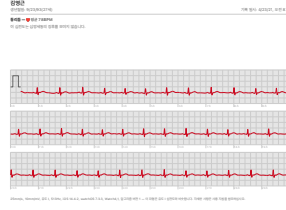
Package loading:

```
# tidyverse family-----  
library(tidyverse)  
# kable-----  
library(knitr)  
library(kableExtra)  
# set seed for report -----  
set.seed(1)
```

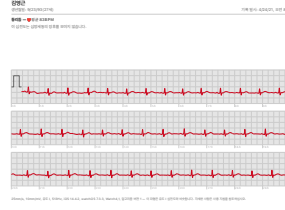
## A.2 ECG Results



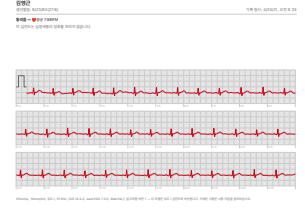
(a) (1,1),House blend: 89 BPM



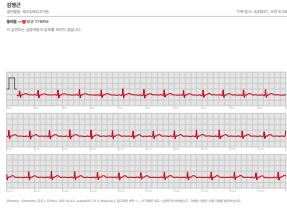
(b) (1,2),Water: 78 BPM



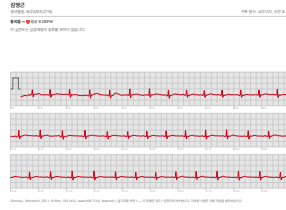
(c) (1,3),Sumatra: 83 BPM



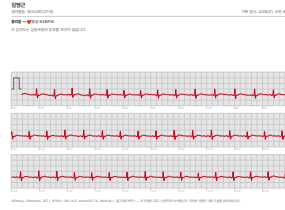
(d) (1,4),Decaf: 79 BPM



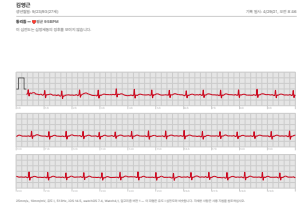
(e) (2,1),Water: 77 BPM



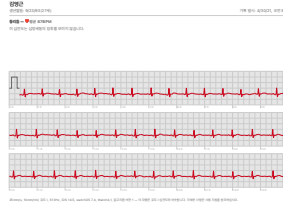
(f) (2,2),Sumatra: 83 BPM



(g) (2,3),Decaf: 93 BPM



(h) (2,4),House blend: 95 BPM



(i) (3,1),Sumatra: 87 BPM

Figure 1: Electrocardiogram after drinking Coffee